

What is claimed is:

1. A SONET-based communication system including at least one millimeter wave wireless link comprising:

- A) a first millimeter wave transceiver system located at a first site capable of transmitting to and receiving information from a second site through atmosphere digital information at rates in excess of 1 billion bits per second said first transceiver comprising an antenna producing a beam having a half-power beam width of about 2 degrees or less,
- B) a second millimeter wave transceiver system located at said second site capable of transmitting to and receiving information from said first site digital information at rates in excess of 1 billion bits per second said first transceiver comprising an antenna producing a beam having a half-power beam width of about 2 degrees or less
- C) at least one local communication network,
- D) a high speed fiber-optic network, and
- E) a SONET aggregation unit;

wherein communication is provided between said at least one local network and said high volume fiber-optics network via said first and second transmission systems and said aggregation unit.

- 2. A system as in Claim 1 wherein said at least one local communication network is a plurality of local communication networks.
- 3. A system as in Claim 1 wherein said first and second transmission systems each further comprises a lower frequency transmission and receiving system capable of a transmitting to and receiving information at rates in excess of 155 million bits per seconds during rainy weather conditions.
- 4. A system as in Claim 1 wherein said first transceiver system is configured to transmit and receive information at frequencies greater than 57 GHz.
- 5. A system as in Claim 1 wherein said first transceiver system is configured to transmit and receive information at frequencies greater than 90 GHz.

6. A system as in Claim 1 wherein said first transceiver system is configured to transmit and receive information at frequencies between 92 and 95 GHz.
7. A system as in Claim 1 wherein one of said first and second transceiver systems is configured to transmit at frequencies in the range of about 92.3 to 93.2 GHz and to receive information at frequencies in the range of about 94.1 to 95.0 GHz.
8. A system as in Claim 3 wherein said lower frequency transmission and receiving systems are back-up transceiver systems operating at a data transmittal rate of less than 155 million bits per second configured continue transmittal of information between said first and second sites in the event of abnormal weather conditions.
9. A system as in Claim 8 wherein said backup transceiver system is a microwave system.
10. A system as in Claim 9 wherein said backup transceiver system is configured to operate in the frequency range of 10.7 to 11.7 GHz.
11. A system as in Claim 10 wherein said backup transceiver system is configured to operate in the frequency range of 5.9 to 6.9 GHz.
12. A system as in Claim 10 wherein said backup transceiver system is configured to operate in the frequency range of 13 to 23 GHz.
13. A system as in Claim1 wherein said first and said second sites are separated by at least one mile.
14. A system as in Claim 1 wherein said first and said second sites are separated by at least 2 miles.
15. A system as in Claim1 wherein said first and said second sites are separated by at least 7 miles.
16. A system as in Claim1 wherein said first and said second sites are separated by at least 10 miles.
17. A system as in Claim1 wherein each of said first and said second transceiver are configured to transmit and receive information at bit error ratios of less than 10^{-10} during normal weather conditions.
18. A system as in Claim 1 wherein both said first and said second transceiver systems are equipped with antennas providing a gain of greater than 40 dB.

19. A system as in Claim 1 wherein both said first and said second transceiver systems are equipped with antennas providing a gain of greater than 45 dB.
20. A system as in Claim 1 wherein both said first and said second transceiver systems are equipped with antennas providing a gain of greater than 50 dB.
21. A system as in Claim 20 wherein at least one of said antennas is a flat panel antenna.
22. A system as in Claim 20 wherein at least one of said antennas is a Cassegrainian antenna.
23. A system as in Claim 20 wherein at least one of said antennas is a prime focus parabolic antenna.
24. A system as in Claim 20 wherein at least one of said antennas is an offset parabolic antenna.
25. A system as in Claim 1 wherein said first and second systems are capable of transmitting and receiving at rates in excess of 1 billion bits per second and the antennas of both systems are configured to produce beam having half-power beam widths of about 0.36 degrees or less.

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